Bailey

SECTION
E12-46

PRODUCT INSTRUCTIONS

SOLID-STATE D-C AMPLIFIER

PT. NO. 6618750-□

INDEX

	Page
Mounting	3
Circuit Description	3
Adjustments	6
Maintenance	8
Replacement Parts	10

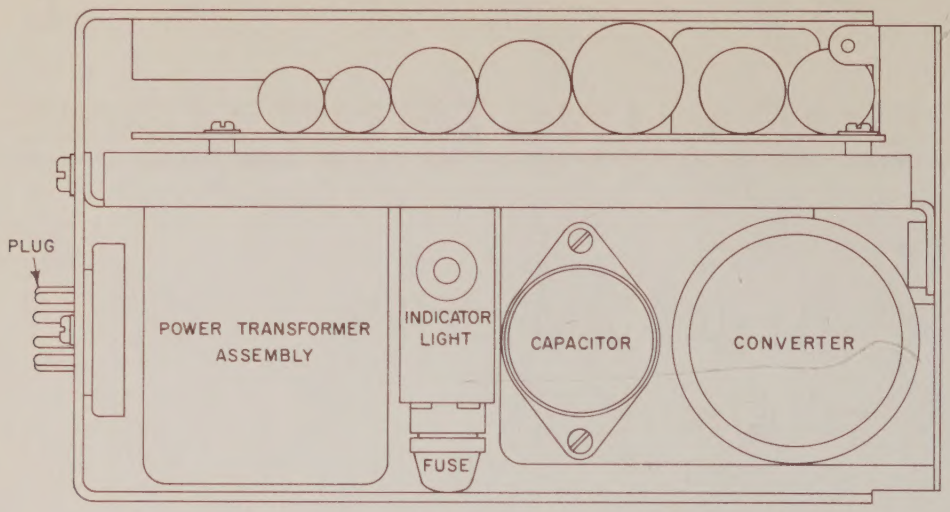
The Electronic Amplifier, Pt. Nos. 6618750-1 and 6618750-2, is used with Class EA, EB, EF, and EG Receivers. The Amplifier consists of a d-c power supply, converter, voltage amplifier, motor control circuit, regulated d-c voltage source, and thermocouple burnout protection circuit. The voltage amplifier detects and amplifies voltage produced by unbalance in the measuring circuit. The amplified output is applied to the motor control circuit, which operates a reversing motor in the required direction to reposition a slidewire and rebalance the measuring circuit.

CROSS REFERENCES

Instrument or Equipment	Instruction Section
Class EA & EB Telemeter Receivers (D-C Potentiometer Circuit)	E12-77
Class EF & EG Temperature Receivers (D-C Potentiometer Circuit)	E12-78
Type KM55 or WM55 Recorder and KM53 or WM53 Indicator	E12-3
Electric Receiver for Type WM55 Recorder and WM53 Indicator (Assembly and Components)	E12-42

BAILEY METER COMPANY • WICKLIFFE, OHIO 44092

FORM IE12-46-368



TOP VIEW

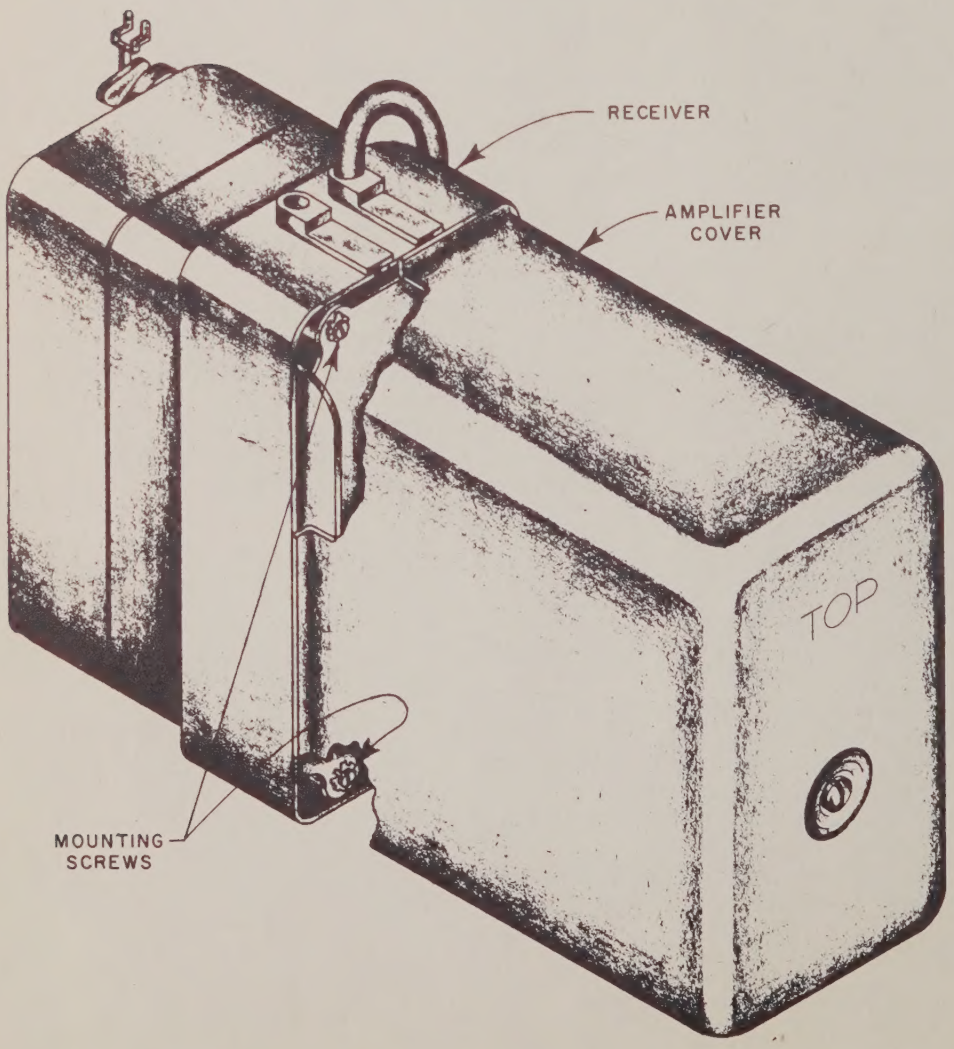


FIGURE 1 - General Assembly

MOUNTING

The Amplifier occupies the rear section of the Electrical Receiver. Removal of the rear cover from the Receiver makes the Amplifier accessible for adjustment, inspection, or repair. It is plugged into a standard tube socket in the Receiver wiring board, and is secured to the Receiver case with four captive mounting screws, as shown in Figure 1. Note the three-wire input cable from the Receiver wiring board to the terminals at the rear of the Amplifier. Disconnect the leads from these terminals before unplugging the unit.

CIRCUIT DESCRIPTION

The Amplifier consists of a d-c power supply, converter, four stage a-c amplifier, motor control circuit, and a regulated d-c voltage source. The interrelationship of these components is shown in Figure 2.

Regulated Voltage Source

Regulated d-c voltage is obtained from a rectified a-c source. A full-wave rectifier, consisting of two diodes, is supplied from the secondary winding of the power supply transformer located on the chassis. The d-c output voltage is filtered and regulated by a Zener diode reference circuit as shown in Figure 3.

Normal variations in line voltage and frequency have no effect on the output voltage. In order to compensate for variations in output voltage caused by aging characteristics of the Zener diode, a rheostat, R29, and a fixed precision resistor, R28, are connected in series with the output voltage from the Zener reference circuit.

The regulated voltage source is adjusted to standard cell voltage, between 1.0189 and 1.0194 volts. Instructions for making this adjustment are given on page 8 of this section.

The d-c regulated voltage is connected to the potentiometer circuit thru plug and socket connectors pins 4 and 5.

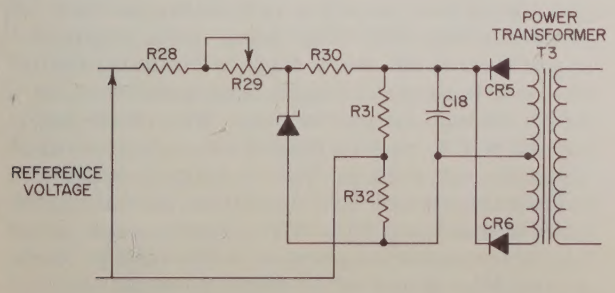


FIGURE 3 - Schematic of Regulated Voltage Source

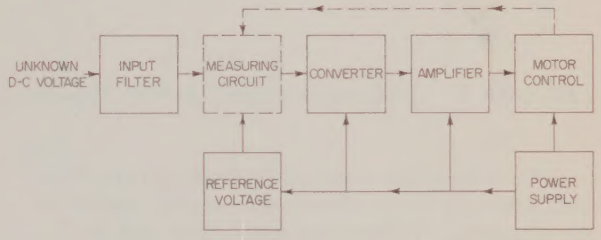


FIGURE 2 - Block Diagram of Amplifier

D-C Power Supply

D-C power for the three-stage Amplifier and motor control circuit is obtained from two full-wave rectifiers, each consisting of two diodes, as shown in Figure 4. Smooth d-c voltage for the Amplifier is provided thru capacitor-resistance filters.

Converter

Two types of converters are used with the Amplifier. Converter Part No. 1941700-1 is used with Amplifier Part No. 6618750-1 for inputs ranging from 5 mv to 25 mv. Converter Part No. 6618300-1 is used with Amplifier Part No. 6618750-2 for inputs ranging from 25 mv to 20 volts.

Converter for Amplifier Part No. 6618750-1

Refer to Figure 5. The d-c unbalance voltage, e_b, is connected to terminals 1 and 3 on the terminal board at the rear of the Amplifier. The input voltage from the d-c pickup is connected to terminal 1 and then to the vibrating reed of the chopper converter.

The input from the slidewire potentiometer circuit is connected to terminal 3 and then to the center tapped primary of the step-up transformer. The output from the step-up transformer is, then, an a-c voltage, the magnitude and phase of which, depend, respectively, upon the magnitude and polarity of the unbalance voltage, e_b.

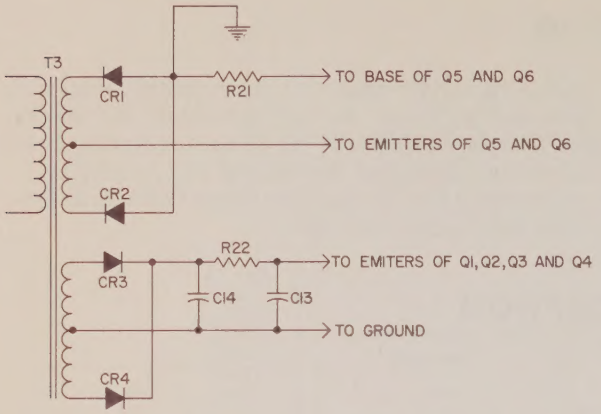


FIGURE 4 - Schematic of D-C Power Supply

The converter housing is dust-proof. Connections are made thru a six-prong socket to the chassis. A defective converter can be identified by scattered periods of erratic pen motion.

Converter for Amplifier Part No. 6618750-2

Refer to Figure 6. The d-c unbalance voltage, e_b, is connected to terminals 1 and 3 on the terminal board at the rear of the Amplifier. The driving transformer connected to pins 1, 2, and 6 turns the transistors on and off, chopping the input signal; the output from the step-up transformer is an a-c voltage, the magnitude and phase of which depend upon the magnitude and polarity of the voltage e_b.

Amplifier

The amplifier, shown schematically in Figure 7, consists of four stages of resistance-coupled amplification, with series feedback between the stages to provide a stable gain. Four transistors are employed. At balance condition, when the input EMF equals the balance back voltage of the measuring circuit, the input voltage to the amplifier is zero. Under this condition, the first stage transistor, Q1, passes a steady d-c collector current which is determined by the characteristics of the transistor and by the values of d-c voltage and collector resistors.

A change in the measured variable produces an a-c input to the amplifier from the converter. This input is applied to the base of the first stage transistor. Since this voltage is alternately positive and negative, it causes corresponding variations in the collector current. These variations in collector current cause an a-c voltage drop to be superimposed on the existing d-c voltage drop thru resistor R3 in the collector circuit.

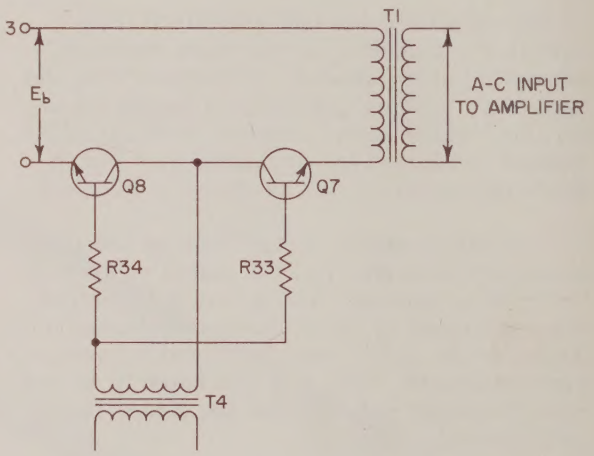


FIGURE 6 - Schematic of Converter No. 6618300-1

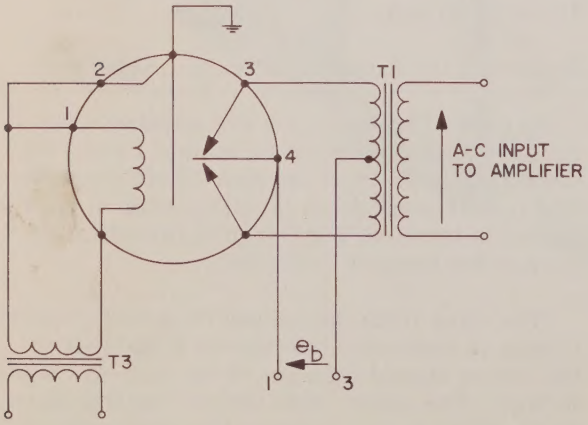


FIGURE 5 - Schematic of Converter No.1941700-1

The output from the first stage of amplification is applied to the base of the second stage transistor, Q2, where it is further amplified and appears as an output across the second stage resistor R6. This output is then applied to the base of the third stage transistor, Q3, where it is amplified again and appears as an output voltage across resistor R11. Blocking capacitor C6, passes only the a-c component of the collector voltage. This voltage is applied across the sensitivity adjustment potentiometer (gain adjustment) R13. The potentiometer setting determines the portion of the voltage drop across R1 applied to the base of the driver stage transistor, Q4.

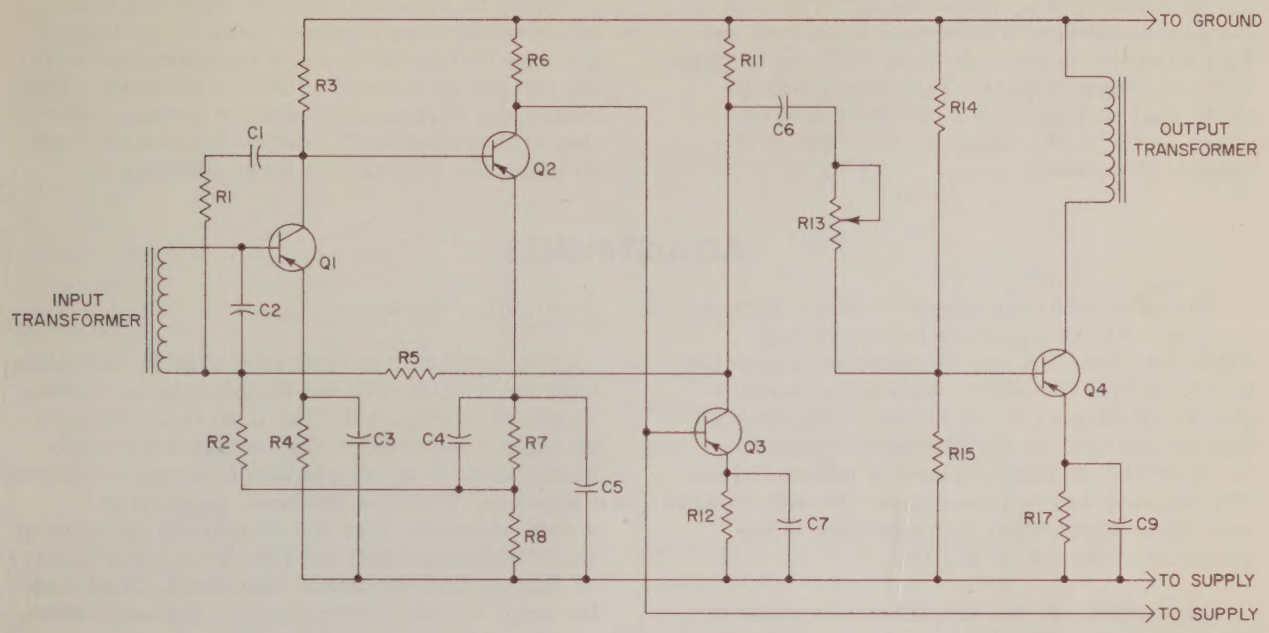


FIGURE 7 - Schematic Diagram of Four Stage A-C Amplifier

The output voltage of the amplifier circuit driver stage is coupled to the power stage of the motor control circuit by means of driver transformer T2 which is designed to match the impedance of the amplifier circuit.

Motor Control Circuit

The motor control circuit, shown schematically in Figure 8, controls the speed and direction of rotation of the reversing motor. The motor control transistors, Q5 and Q6, are connected in a push-pull configuration to control the power to the center-tapped control winding of the motor.

When the measuring circuit is balanced, the a-c base voltage is zero and collector current thru the motor control transistors is full-wave rectified d-c. When the measuring circuit is unbalanced (on an increase or decrease in the measured variable), the 60 cycle base voltage signal modifies the current thru the transistors by cutting off collector current during half of the cycle. The half cycle of collector current that is cut off depends on the phase of the amplifier output voltage, which in turn, depends on the direction of unbalance of the measuring circuit. Note in Figure 8 the i_c curves for an increase and a decrease in measured variable.

The change in collector current also depends on the magnitude of the amplifier output voltage. Thus as the base voltage decreases, it decreases every other half cycle of the collector current, until only a small 120 cycle component remains.

Capacitors C10 and C11 are in parallel with the motor control winding. The parallel circuit is tuned so that the capacitors are in resonance with the winding inductance for 60 cycles. This produces a large a-c voltage, E_{M1}, at unbalance, of 60 cycle frequency across the motor control winding, improving sensitivity.

Depending on the phase of the amplifier voltage output, as explained above, the phase of voltage E_{M1} across the motor control winding W_c is either in phase with or 180^o out of phase with the supply voltage. The magnitude of E_{M1} will depend upon the amount of unbalance of the measuring circuit.

Reference winding W_P is supplied with current thru a phase shifting capacitor, C13,

directly from the a-c supply voltage. This capacitor causes the phase of voltage E_{M2}, across winding W_P, to be almost 90° ahead of the supply voltage. Therefore, since voltage E_{M1} is either in phase with or 180° out of phase with the supply voltage, E_{M2} either lags or leads E_{M1} and the motor operates as a two phase motor in the direction required to rebalance the circuit.

Thermocouple Burnout Protection

Refer to Figure 9. Bias voltage has been added to the base of stage three of the Amplifier, so that in the event of thermocouple burnout the pen is moved to 100% or 0% chart. This makes the burnout immediately evident, operating high temperature alarms if installed, and avoiding the results of a false reading.

ADJUSTMENTS

These adjustments should be made in conjunction with the complete calibration of Class EA, EB, EF, or EG Receivers mounted in a Type WM Recorder. Follow the step-by-step instructions outlined under "Adjustments and Calibration" in the instruction section covering the particular class of Receiver (see "Cross References"), and make the adjustments described below when recommended in the applicable instruction section.

Adjustments to the Amplifier are made at the rear of the chassis, with the Amplifier cover removed. See Figure 10.

Sensitivity Adjustment

The Amplifier is furnished with an indicating light in parallel with the motor control winding, as shown in Figure 9. The light is lit when the 60 cycle component of the voltage across the motor control winding is large enough to operate the motor. With the Receiver measuring a steady variable, turn the sensitivity adjustment shaft clockwise until the indicating light lights or flashes and the motor oscillates. Then turn the shaft counterclockwise until the oscillation stops and the light remains dim or out.

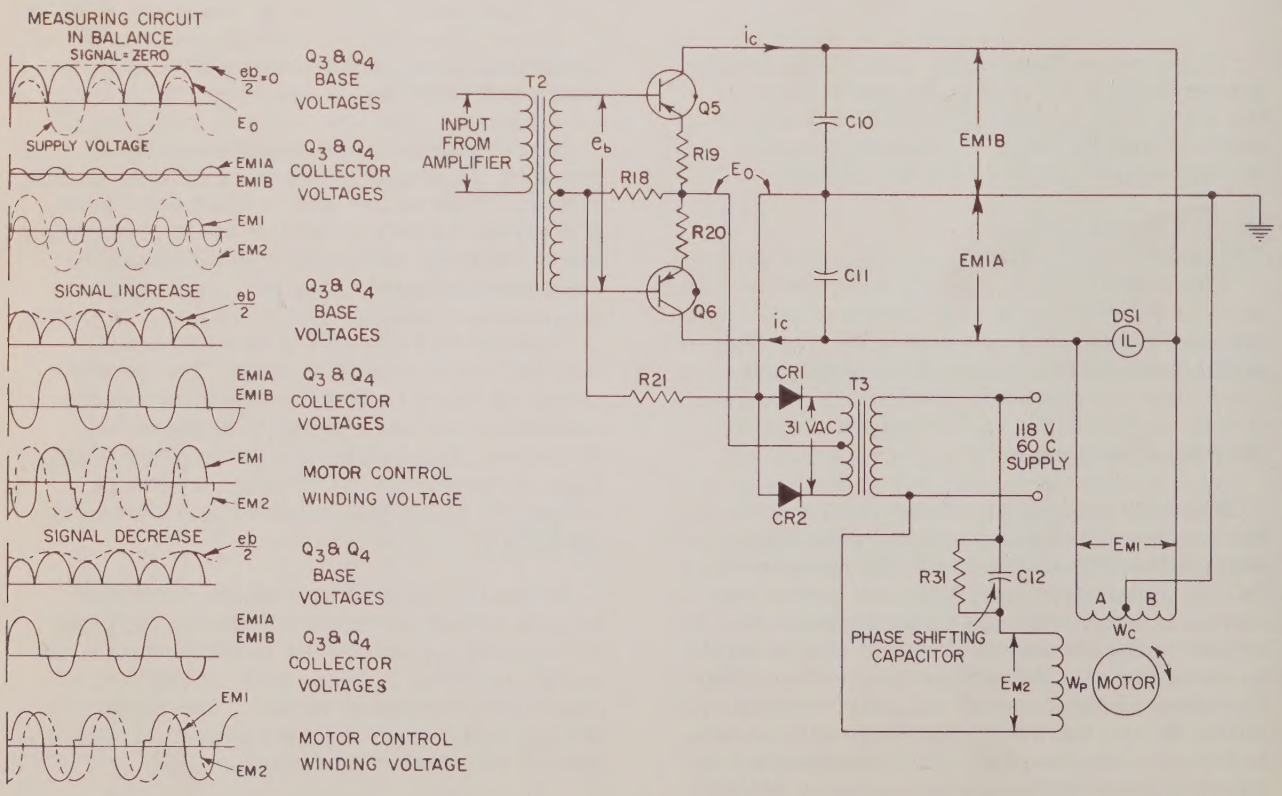
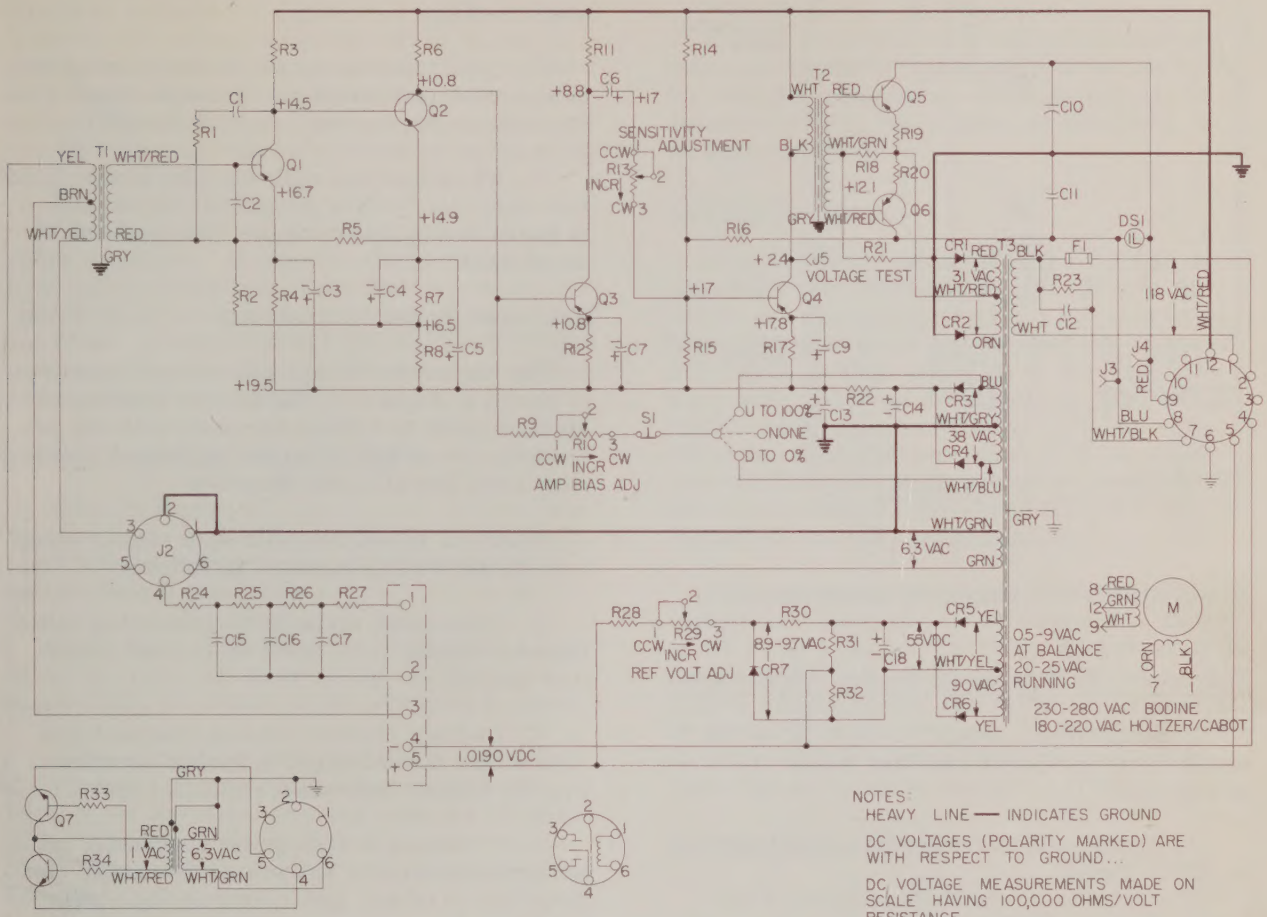


FIGURE 8 - Schematic Diagram of Motor Control Circuit



MT2
PART NO. 6618300-1 USED WITH AMPLIFIER PART NO. 6618750-2

MT1
PART NO. 1941700-1 USED WITH AMPLIFIER PART NO. 6618750-2

NOTES:

HEAVY LINE — INDICATES GROUND

DC VOLTAGES (POLARITY MARKED) ARE WITH RESPECT TO GROUND...

DC VOLTAGE MEASUREMENTS MADE ON SCALE HAVING 100,000 OHMS/VOLT RESISTANCE...

AC VOLTAGE MEASUREMENTS MADE ON SCALE HAVING 5000 OHMS/VOLT RESISTANCE..

C1	CAP. .01MFD 50V	R8	RES 2.8K 1/2W 1%	R31	RES 25K 3W 1%WW
C2	CAP. .068MFD 50V	R9	RES 33K 1/2W 5%	R32	RES 85 OHMS 1W 1%WW
C3, C4, C9	CAP. 500MFD 6V	R10	POT. 2.5 MEG	R33, R34	RES 499 OHMS 1/2W 1%
C5	CAP. 2000MFD 6V	R11, R12	RES 6.8K 1/2W 5%	CR1-6	DIODE 1N3193
C6, C7	CAP. 500MFD 15V	R13	POT. 250K	CR7	ZENER DIO 1N2621 9.3V
C10, C11	CAP. 25MFD 50V N.P.	R14	RES 22K 1/2W 5%	Q1	TSTR 2N1185
C12	CAP. .6MFD 330V	R15	RES 3.3K 1/2W 5%	Q2, Q3, Q4	TSTR 2N466
C13, C14	CAP. DUAL 500MFD 25V	R16	RES 620K 1/2W 5%	Q5, Q6	TSTR 2N376A
C15, C16, C17	CAP. 12MFD 25V	R17	RES 2.4K 1/2W 5%	Q7, Q8	TSTR RCA #36470
C18	CAP. 60MFD 100V	R18	RES 2.7 OHMS 1/2W 5%	T1, T2, T3, T4	TRANSFORMER
R1, R22	RES 1K 1/2W 5%	R19, R20	RES 4 OHMS 3W 1%WW	F1	FUSE 1 AMP
R2	RES 470 OHMS 1/2W 5%	R21	RES 220 OHMS 1W 5%	S1	PUSHBUTTON SWITCH
R3	RES 28K 1/2W 1%	R23	RES 100K 1/2W 5%	MT1, MT2	CONVERTER
R4	RES 5.62K 1/2W 1%	R24, R25, R26, R27	RES 2K 1/2W 5%	J1	AMPLIFIER PLUG
R5	RES 1 MEG 1/2W 5%	R28	RES 3.75K 1W 1%WW	J2	6 PIN SOCKET
R6	RES 11K 1/2W 1%	R29	TRIMPOT 500 OHMS .8W	J3, J4, J5	TEST JACK
R7	RES 1.8K 1/2W 5%	R30	RES 4.3K 1W 1%WW	DS1	INDICATOR LIGHT

FIGURE 9 - Schematic Diagram of Complete Amplifier

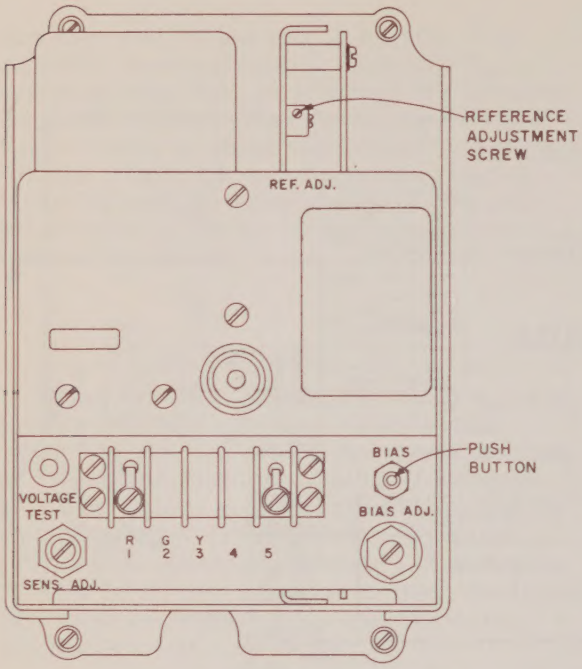


FIGURE 10 - Amplifier Adjustments

Thermocouple Burnout Protection Adjustment

This adjustment should be made after the sensitivity adjustment has been made. Refer to Figure 10.

1. Adjust input until pen is approximately at 50% of range.

2. Depress bias pushbutton S1 and note position of pen, then release button.

3. If position of pen in step 2 does not deviate 2% from pen position in step 1, turn bias adjustment screw until deviation in step 2 is 2%.

4. Open input leads and check for proper motor drive and direction. If motor drive or direction is not correct, recheck Amplifier.

5. 2% calibration shift introduced by thermocouple burnout protection adjustment is corrected by resetting pen linkage zero adjustment.

Reference Voltage Adjustment

The reference voltage adjustment trimmer is shown in Figure 10. Ordinarily this adjustment is made by turning the shaft until the pen reading agrees with a known calibrated reference input signal to the Receiver.

However, to set the reference voltage equal to a standard cell, proceed as follows:

1. Disconnect three-wire connecting cable from terminals 1, 2, and 3 at rear of Amplifier chassis.

2. Connect positive lead of standard cell to terminal 5, and negative lead to terminal 1. Place a jumper between terminals 3 and 4.

3. If reference voltage is incorrectly set, slidewire reversing motor will operate in one direction or other, and indicating light will light. Readjust reference voltage until light dims or goes out.

MAINTENANCE

Voltage and Frequency Variations

The Electronic Amplifier is designed to operate from a 118 volt 60 cycle supply. Line voltage variations from 107 volts to 127 volts and frequency variations from 58 to 62 cycles per second will have no serious effects on accuracy and sensitivity.

Line voltage below 107 volts will result in loss of sensitivity and may cause sluggish operation of the reversing motor.

Line voltage above 127 volts may cause excessive heating in the Amplifier and in the reversing motor, particularly when the unit is subjected to high ambient temperatures.

Dusty and Damp Locations

The Amplifier cover, which is part of the Receiver case, is designed to minimize the accumulation of moisture or dust on the Amplifier. No trouble should be encountered from these factors in normal locations.

NOTE: Avoid damp or extremely dusty locations, since the gradual accumulation of dirt and moisture on the wiring, connections, and parts, may cause excessive electrical leakage and eventual breakdown.

Test for Faults

The cause of defective operation or failure

to operate should be traced definitely to the Amplifier before any detailed check of this unit is attempted. The simplest and best way to do this is to replace the defective Amplifier with a spare. If a spare is not carried in stock, it may be borrowed from another Receiver. (Be sure that both units bear the same part number.) If no spare is available, refer to the trouble-shooting chart for the class of Receiver being tested.

If the Receiver operates properly with the spare Amplifier, it may be assumed that the first unit is defective. If the Receiver fails to operate with a spare that is known to be in good condition, it indicates that the source of trouble is elsewhere, and that the Receiver and external wiring should be checked.

Inspection and Operational Checks

Refer to Figure 1.

Check the 1-amp fuse located next to the motor control test jacks.

Check the transistors in the defective Amplifier by replacing them one by one with transistors that are known to be operating properly.

If these checks do not reveal the source of the trouble, remove the Amplifier from the back of the Receiver case and remove the base plate. Check for shorts between prongs of the transistor sockets, broken connections to these sockets, broken wires, etc.

Excessive heating of the power supply transformer, as indicated by melting of the encapsulating compound, indicates a defective transformer, a short or ground in the wiring, or a shorted filter capacitor.

Unless the source of trouble indicated by these symptoms is in the external wiring or in the transistor socket connections and can be repaired easily, the entire unit should be returned to the factory.

Circuit Checks

Circuit voltage checks which should locate any trouble in the Amplifier are given in Figure 9. A volt-ohm-meter and a 12-wire cable having suitable plugs at each end are required. The cable permits operation of the Amplifier when removed from the Receiver. The test meter should be a multirange type, suitable for measuring both a-c and d-c. It must also have an internal resistance of at least 100,000 ohms/volt for d-c measurements and 5,000 ohms/volt for a-c measurements.

Make the measurements indicated and check resistance values as given in Figure 9. Refer to the Fault Location Chart for an indication of the probable fault. If these tests indicate a defective Amplifier that cannot be repaired simply by replacing a transistor or capacitor assembly or by repairing a connection, the Amplifier should be returned to the factory for repair.

Routine Maintenance

Avoid operating the unit in locations with temperatures in excess of 120F. Operation at higher ambient temperatures will damage the insulation and eventually cause breakdown.

FAULT LOCATION CHART

MEASURING POINT TO GROUND	PROBABLE FAULT	MEASURING POINT TO GROUND	PROBABLE FAULT
JCT OF C1 & Q1 COLLECTOR. VOLTAGE IS LOW. VOLTAGE IS HIGH.	 Q1, Q2, Q4 DEFECTIVE. C1 SHORTED. Q1, Q2, Q3 DEFECTIVE. C3, C4, C5, C6, C9 SHORTED.	JCT OF R17 & Q4 EMITTER. VOLTAGE IS LOW. VOLTAGE IS HIGH.	 Q3, Q4 DEFECTIVE. C6, C9 SHORTED. Q4 DEFECTIVE.
JCT OF R4 & Q1 EMITTER. VOLTAGE IS LOW. VOLTAGE IS HIGH.	 Q1, Q3, Q4 DEFECTIVE. C1, C9 SHORTED. Q1, Q2 DEFECTIVE. C3, C5, C7 SHORTED.	VOLTAGE TEST JACK 5. VOLTAGE IS LOW. VOLTAGE IS HIGH.	 Q4 DEFECTIVE. C1, C7 SHORTED. Q4 DEFECTIVE. C6, C9 SHORTED.
JCT OF R6 & Q2 COLLECTOR. VOLTAGE IS LOW. VOLTAGE IS HIGH.	 Q1, Q2, Q4 DEFECTIVE. C1, C3, C9 SHORTED. Q1, Q2, Q3 DEFECTIVE. C4, C5, C6, C7 SHORTED.	JCT OF R13 & C6 VOLTAGE IS HIGH.	 Q1 DEFECTIVE
JCT OF R7 & Q2 EMITTER. VOLTAGE IS LOW. VOLTAGE IS HIGH.	 Q2, Q3, Q4 DEFECTIVE. C1, C6, C9 SHORTED. Q1, Q3 DEFECTIVE. C3, C4, C5, C7 SHORTED.	JCT OF R8 & C3 VOLTAGE IS LOW. VOLTAGE IS HIGH.	 C7 SHORTED. Q1, Q4 DEFECTIVE.
JCT OF R12 & Q3 EMITTER. VOLTAGE IS LOW. VOLTAGE IS HIGH.	 Q1, Q2, Q3, Q4 DEFECTIVE. C1, C3, C9 SHORTED. Q1, Q4 DEFECTIVE. C4, C5, C7 SHORTED.	JCT OF R7 & C4 VOLTAGE IS LOW. VOLTAGE IS HIGH.	 Q2 DEFECTIVE. Q1, Q2 DEFECTIVE.
JCT OF R11 & Q3 COLLECTOR. VOLTAGE IS LOW. VOLTAGE IS HIGH.	 Q1, Q2, Q3 DEFECTIVE. C5, C9 SHORTED. Q1 DEFECTIVE. C6 SHORTED.	ALL POINTS. VOLTAGE IS LOW.	 CR3, CR4 DEFECTIVE. C13, C14 SHORTED. T3 DEFECTIVE.
JCT OF R15 & Q4 BASE. VOLTAGE IS LOW. VOLTAGE IS HIGH.	 C6 SHORTED. Q2, Q4 DEFECTIVE.	MOTOR RUNS TO 0% CHART. MOTOR RUNS TO 100% CHART.	 Q2 DEFECTIVE. C1 SHORTED. Q2, Q3 DEFECTIVE. C2 SHORTED.

REPLACEMENT PARTS

Recommendations of parts that should be stocked for these units are made in Instruction Sections E12-77 and E12-78.

Figure 11 is a Parts Drawing for the Electronic Amplifier, Part Numbers 6618750-1 and 6618750-2. This drawing normally will apply to Amplifier bearing these part numbers. However, there may be individual differences in specific units because of:

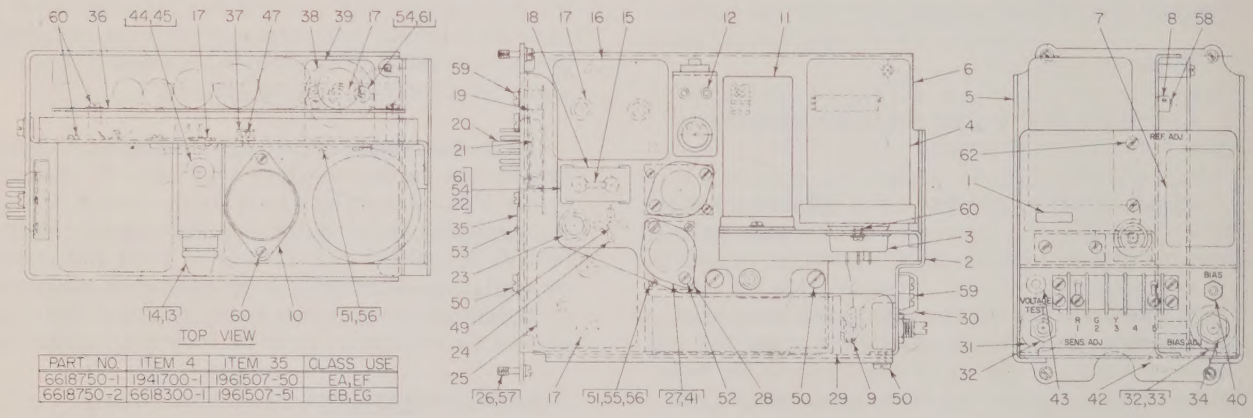
a. Design changes made since the printing of this Instruction Section.

b. Special design of the Amplifier furnished, to make it suitable for a special application.

Therefore, when ordering parts, assure correct replacements for the Amplifier by specifying on the order:

1. Amplifier Part Number and Code Number, and the Class of Electrical Receiver in which it is mounted.

2. The Parts Drawing on which each part is illustrated. (The Parts Drawing Number is given in the title for the Figure.)



PART NO.	ITEM 4	ITEM 35	CLASS USE
6618750-1	1941700-1	1961507-50	EA, EF
6618750-2	6618300-1	1961507-51	EB, EG

ITEM	PART NO.	NAME
1	1961056-1	CODE LABEL
2	6618754-1	END PLATE
3	1941713-1	SOCKET
4	SEE TABLE	CONVERTER
5	6618759-1	FRAME ASSEMBLY
6	6618752-1	CHASSIS ASSEMBLY
7	1961072-1	INSTRUCTION LABEL
8	1942530-5	TRIMMER
9	194841-6	RESISTOR, 4 REQD
10	69026-1	MOUNTING RING
11	1943209-1	CAPACITOR
12	1942826-1	TEST JACK, 2 REQD
13	1941504-1	FUSE EXTERNAL POST
14	194776-11001	1 AMPERE FUSE
15	194841-24	RESISTOR
16	6618705-1	POWER TRANS. ASSEMBLY
17	67125-3	GROMMET, 7 REQD
18	1941160-2	PYRANOL CAPACITOR
19	667182-1	PLUG MTG. CUP ASSEMBLY
20	194963-4	PLUG
21	194965-1	RETAINING RING
22	6610432-1	BRACKET
23	67125-2	GROMMET
24	6612573-1	GROUND TERMINAL, 2 REQD
25	6618703-1	DRIVER TRANS. ASSEMBLY
26	666719-1	MOUNTING SCREW, 4 REQD
27	1943206-1	TRANSISTOR, 2 REQD
28	1943177-1	TRANS. SOCKET, 2 REQD
29	6612554-1	CAPACITOR
30	1941515-2	TERMINAL STRIP
31	1942153-2	POTENTIOMETER
32	197249-1	WASHER LOCKNUT, 2 REQD
33	1942153-3	POTENTIOMETER
34	1942329-1	SHAFT LOCK
35	SEE TABLE	NAMEPLATE
36	6618661-1	COMPONENT BD ASSEMBLY
37	1943187-3	CABLE CLIP
38	6616365-1	INPUT TRANS.
39	6612415-1	MOUNTING BRACKET
40	6616375-2	PUSHBUTTON
41	1943290-1	INSULATING WASHER, 2 REQD
42	197240-1	CABLE CLIP
43	1941503-1	TEST JACK
44	1944298-1	SOCKET
45	1944297-1	INDICATOR LAMP
49	3-48x3/16	PAN HEAD EXT. SEMS
50	10-32x1/4	PAN HEAD SCREW, 6 REQD
51	4-40x1/4	PAN HEAD SCREW, 6 REQD
52	6-32x3/8	P-K TYPE Z DR SCR, 4 REQD
53	0	TYPE U P-K DR SCR, 2 REQD
54	6-32	HEX NUT, 4 REQD
55	4-40	HEX NUT, 4 REQD
56	1104-00	SHKPF LOCKWASHER, 6 REQD
57	1108	SHKPF LOCKWASHER, 4 REQD
58	2-56x5/16	PAN HEAD SCREW, 2 REQD
59	6-32x3/8	PAN HEAD EXT. SEMS, 6 REQD
60	4-40x3/16	PAN HEAD EXT. SEMS, 12 REQD
61	1106-00	SHKPF LOCKWASHER, 4 REQD
62	6-32x3/16	PAN HEAD EXT. SEMS, 4 REQD

FIGURE 11 - Parts Drawing - E12-69, Amplifier Pt. No. 6618750-□

Product Warranty

Bailey Meter Company warrants the products manufactured by it to be free from defects in material and workmanship and will repair or replace, at its option, free of charge, f.o.b. its factory, such part or parts which prove defective within one year from date of shipment. In respect to any products which are not an integral part of a product manufactured by the Company, the warranty given by the manufacturer thereof shall apply.

Shipping Damage

We strongly recommend that you inspect and test your instrument as soon as you receive it. If the instrument is damaged or operates improperly, notify the carrier for inspection of the shipment. The carrier's claim agent will prepare a report of damage, a copy of which should be forwarded to your nearest Bailey District Office (see back cover for location). The District Office will then tell you how to have the instrument repaired or replaced.

Service

The Bailey Meter Company is vitally concerned that your Bailey instrument provides continued, fine performance. This instruction manual is designed to fully describe the correct installation, operation, and maintenance of your instrument under recommended conditions. If the need arises, factory-trained Service Engineers are on call for prompt, in-plant maintenance. Telephone or wire your nearby Bailey District Office to make arrangements for this service (see back cover for location and telephone number).

Replacement Parts and Supplies

Complete parts drawings and recommended spare parts kit information are included in this instruction manual. When replacement parts or supplies are required for maintenance of your Bailey instrument, contact your nearest Bailey District Office (see back cover for location). Always specify complete data on the instrument nameplate on your inquiry or order for parts. Common parts are available for shipment within 48 hours on a speed-order basis.

BAILEY METER COMPANY DISTRICT OFFICES, U.S.A.

CALIFORNIA

San Francisco
Code 415 Phone 989-6140

Los Angeles
Code 213 Phone 283-1187

COLORADO

Denver
Code 303 Phone 757-5408

GEORGIA

Atlanta
Code 404 Phone 378-4348

ILLINOIS

Chicago
Code 312 Phone 427-7324

LOUISIANA

New Orleans
Code 504 Phone 488-0841

MASSACHUSSETS

Boston
Code 617 Phone 426-0465

MICHIGAN

Detroit
Code 313 Phone 357-0440

MINNESOTA

St. Paul
Code 612 Phone 645-7752

MISSOURI

Kansas City
Code 816 Phone 361-4902

St. Louis
Code 314 Phone 962-5532

NEW YORK

Buffalo
Code 716 Phone 839-3662

New York
Code 212 Phone 986-8770

Schenectady
Code 518 Phone 374-7991

NEW JERSEY

East Orange
Code 201 Phone 674-6830

NORTH CAROLINA

Charlotte
Code 704 Phone 334-9161

OHIO

Cincinnati
Code 513 Phone 281-0132

Cleveland
Code 216 Phone 851-8600

PENNSYLVANIA

Philadelphia
Code 215 Phone 664-3282

Pittsburgh
Code 412 Phone 921-6356

TEXAS

Dallas
Code 214 Phone 363-6295

Houston
Code 713 Phone 774-9605

WASHINGTON

Seattle
Code 206 Phone 324-9300

WISCONSIN

Milwaukee
Code 414 Phone 461-1310

BAILEY METER COMPANY LTD., CANADA

ALBERTA

Edmonton
Code 403 Phone 488-3436

BRITISH COLUMBIA

Vancouver
Code 604 Phone 731-3709

MANITOBA

Winnipeg
Code 204 Phone 943-1481

NOVA SCOTIA

Halifax
Code 902 Phone 455-0574

ONTARIO

Ottawa
Code 613 Phone 722-1373

Toronto
Code 416 Phone 444-8488

QUEBEC

Montreal
Code 514 Phone 489-3881

Bailey

Bailey Meter Company • Wickliffe, Ohio 44092

In Canada: Bailey Meter Company Limited, Montreal, Canada